YOU & MATHS H is the point of coordinates $(-2, 5)$ and K is the point $(-2, -5)$. Show that the x-axis bisects the line segment HK. T is the point such that the origin is the centre of HT. Find the coordinates of T. Verify that the y-axis bisects the line segment KT.

(IR *Leaving Certificate Examination, Ordinary Level*, 1992)

i. Let us show first that the x-axis bisects the line segment HK, which is equivalent to showing that the x-axis is perpendicular to HK and that it cuts HK in half.
The equation of the line through HK is:

$$x = -2,$$

as points H and K have the same x-coordinates. The equation of the x-axis is $y = 0$, so we see right away that the two lines are perpendicular.

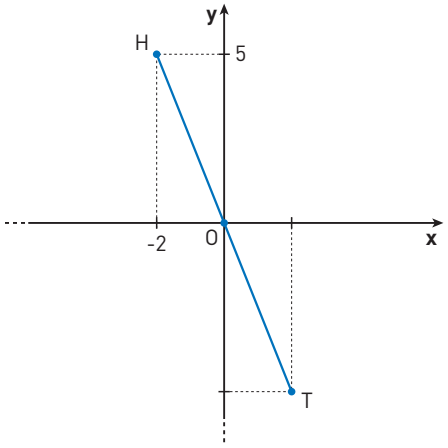
Moreover, the point of intersection between the x-axis and the line segment HK has coordinates $(-2; 0)$. If we call this point P, then:

$$\overline{HP} = |y_P - y_H| = |0 - 5| = 5;$$

$$\overline{PK} = |y_K - y_P| = |-5 - 0| = 5.$$

We can therefore conclude that the x-axis cuts the line segment HK in half.

ii. Point T is symmetric to point H with respect to the origin, so its coordinates will be the opposite of the coordinates of H. Therefore we have $T(2, -5)$.



iii. To verify that the y-axis bisects the line segment KT, we proceed as in **i**.
The equation of the line through KT is:

$$y = -5,$$

as points K and T have the same y-coordinate. The equation of the y-axis is $x = 0$ and that makes it clear that the two lines are perpendicular.

Assuming that they intersect in point Q, which has coordinates $(0, -5)$, we have:

$$\overline{KQ} = |x_Q - x_K| = |0 - (-2)| = 2;$$

$$\overline{QT} = |x_T - x_Q| = |2 - 0| = 2.$$

We now know that the y-axis cuts the line segment KT in half and is perpendicular to it, so we can say that the y-axis bisects KT.